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INSTITUTE OF GAS TECHNOLOGY

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GAS ABSTRACTS

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1. GAS INDUSTRY

Canadian Gas

Irwin, A. B. NEW GRID SYSTEM DRAFTED TO SPEED UP EXPLORATION. *World Oil*, 137, (1953), 262-67, December.

Canada's Department of Resources and Development has recently effected a new set of regulations governing oil and gas rights in the Northwest Territories and Yukon Territory under which the staking requirement for acquiring 64,000 acre permits to explore has been discarded and "staking on the map" adopted in conformity with a grid pattern at 10 minute intervals of latitude and 15 minute intervals of longitude. Possibility of disputes is eliminated, and acquisition and administration are simplified. Exploration, drilling and production regulations have been altered to conform more closely with those of Alberta and Saskatchewan. H. C. Owen

GAS DEADLOCK PROLONGED. *Oil Gas J.*, 52, 97-8, (1953), December 14.

The Alberta Petroleum and Natural Gas Conservation board after months of hearings on the applications of Trans Canada Pipe Lines Ltd. to pipe natural gas to Eastern Canada, and Western Pipe Lines Ltd. to export natural gas to the Minneapolis area has turned the matter over to federal authorities. It has been recommended that these two companies merge. R. F. Bukacek

Fuel Parity

Major, W. S. WHAT ARE PARITY PRICES OF FUELS? *Coal-Heat*, 65, 18-20 (1953) November.

Tables are presented to show the relationship of fuel prices to provide the same quantity of heat at the same cost for 1) hotel or commercial building, 2) non-recovery industrial, and 3) heat recovery industrial plants. These tables present some adjustment in cost estimates for differences in combustion efficiency, handling costs and operating costs.

O. P. Brysch

Gas Industry Report

Smith, F. C. THE GAS INDUSTRY IS A UNITED INDUSTRY. *Public Utilities Fortn.*, 52, 669-73, (1953), November 5.

The President of the American Gas Association writes of the goals and achievements of the gas industry, its development program and the unification in policy and program taking place.

R. F. Bukacek

Pacific Northwest Gas

Iulo, W. NATURAL GAS IN THE PACIFIC NORTHWEST: SOME ECONOMIC ASPECTS. State College of Washington, Bur. Economic and Business Research, Bull. No. 25 (1953) November.

This bulletin presents various phases of the problem involved in bringing natural gas to the Pacific Northwest. It consists mostly of data taken from the record of the recent relevant hearing before the Federal Power Commission. H. C. Owen

Public Safety

Owens, S. PUBLIC NEED NOT FEAR GAS LINES. *Petroleum Eng.*, 25, D26, 28, D30 (1953) November.

This article describes safety measures followed in design, construction and operation of transmission lines to protect public and employees against property damage or personal injury through failure of pipe or auxiliary equipment.

A. E. Neumann

Scope of Regulation

Baker, H. H. FIVE REASONS WHY FPC SHOULD NOT CONTROL FIELD PRICES OF NATURAL GAS. *Gas Age*, 112, 32, 33, (1953) December 3.

The FPC control of the producer's field price is contrary to the intent of Congress as expressed in the Natural Gas Act; production is highly risk-taking and competitive, differing completely from a public utility; regulation will not protect the interests of the consumers as well as competition; control will lead to shortages of gas; and controls will eventually bring higher prices to consumers. The solu-

tion of this problem lies in Congressional legislation which expressly prevents the FPC from 1) regulating production and gathering of natural gas; 2) fixing or regulating the producer's or gatherer's price, and 3) fixing natural gas company rates below a level allowing a fair return for the investment of gathering system. It is essential for adequate future supplies of natural gas that the gas industry be free to compete with oil and coal on equal terms.

B. E. Eakin

Ralph, H. D. and Linz, B. F. PHILLIPS RULING TO MEAN FEDERAL CONTROL . . . BUT TO WHAT EXTENT? *Oil Gas J.*, 52, 68-70 (1953) December 7.

This article reviews the various possible actions of the FPC and gas producers following the Supreme Court decision which in effect ordered the FPC to regulate as utilities all producers, gatherers and processors of natural gas in interstate trade. Gasoline plants, gathering lines, and even lease operators may go under control which could reach to the wellhead, with the value of crude deducted in fixing gas prices.

A. E. Neumann

Rate-Making Base

Dean, A. H. THE IMPACT OF CHANGING PRICE LEVELS ON RATE MAKING. *Public Utilities Fortn.*, 52, 817-36, (1953) December 3.

The Power Commission continues to base rate cases on actual cost of plant built in some past period with no regard for the subsequent inflation. The situation is critical and adjustments should be made before the utilities are permanently injured. W. G. Bair

2. APPLIANCES

Multi-Gas Burner

Reichelderfer, C. A. (assigned to Norman Products Co.) APPARATUS FOR THE SELECTIVE BURNING OF DIFFERENT TYPE GASEOUS FUELS EMBODYING A COMMON BURNER ELEMENT. U. S. 2,661,157 (1953) December 1.

An invention of an apparatus for selective burning of different types of gaseous fuels through a common burner with individually operated feed manifolds actuated by either a pressure change in the fuel supply lines or temperature change within heated space.

M. Quinn

Solar Heating

Jordan, R. C. and Threlkeld, J. L. SOLAR ENERGY AVAILABILITY FOR HEATING IN THE UNITED STATES. *Heating, Piping and Air Conditioning*, 25, 111-122 (1953) December.

This first of three articles deals with the availability of solar energy in the United States. The depletion of the country's fuel reserves and necessity for direct utilization of solar energy in the future is discussed. Results of extensive calculations showing distribution of solar radiation available in the United States on variously oriented surfaces are presented for cases 1) outside the atmosphere, 2) at the earth's surface during cloudless days and 3) at the earth's surface during all days. Included are discussions of the earth's position relative to the sun, the solar constant, and depletion of radiation by the atmosphere. The superiority of a south-facing surface for interception of winter sunshine is shown. Maps show estimated average daily radiation incident upon a south-facing vertical surface for December and January. Results of analyses of U. S. Weather Bureau records for Blue Hill, Mass.; Madison, Wis.; Lincoln, Ne.; Nashville, Tenn. and New Orleans, La. are discussed.

Authors' Abstract

Space Heating

THE TYPICAL GAS HEAT USER. *Gas Heat*, 4, 21-22, 36, (1953) November.

Findings in the Philadelphia, Pittsburgh, Chicago and Hudson River Valley areas are reported. A discussion is given on gas heating saturation by income, and market saturation of gas appliances. Tables are presented illustrating this data. R. Parker

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution Problem

Pettit, A. B. ECONOMIC ASPECTS OF AIR POLLUTION. *South. Chem. Ind.* 5, 8-10 (1953) November-December.

Estimates reveal that air pollution results in a national loss of over one billion dollars per year, inclusive of damage to fabric, equipment, buildings, and plants. Another estimate indicates industry is expending 100 million dollars annually to combat air pollution. A rational approach is urged, the objective such that the atmosphere is allowed to function to its fullest capacity as a recipient of emitted wastes, yet within a limit of the amount of foreign material in the air. A. J. Tulis

Regan, C. J. AIR POLLUTION. *Chem. & Ind.* (British), (No. 47) 1238-44, (1953), November 21.

A detailed summary of the present status of the air pollution problem is presented. The cost of air pollution effects (not including damages to health) is said to amount to at least 5 shillings per ton of coal burned.
C. E. Hummel

Burner Design

Clark, T. P. FORMATION AND COMBUSTION OF SMOKE IN BUNSEN FLAMES. *Ind. Eng. Chem.*, 45, 2785-2789, (1953) December.

Results of a study of the variables expected to influence smoke formation in flames are presented. The experimental procedure was carried out on laboratory bench-scale apparatus. Included are studies of the smoke burning capacities of ethylene-air Bunsen flames and the effects of initial gas temperature, fuel flow rate, flame length, and secondary air variation on the smoking tendencies of benzene-air Bunsen flames. M. Quinn

Gas-Fire Fighting

EXTINGUISHING TYPICAL NATURAL GAS FIRES WITH DRY CHEMICAL EQUIPMENT. *Gas Age*, 112, 30-31, 58-60 (1953) December 3.

An extensive series of tests has been completed on the ability of dry chemical extinguishers to put out natural gas fires. Conclusions have been developed for estimating the amount of dry chemical necessary to extinguish natural gas fires based on the flow rate of the natural gas. W. G. Bair

Gas Turbine

Bolsezian, G., (France). SEMICLOSED CYCLE GAS TURBINE PLANT. U. S. 2,651,-174 (1953) September 8.

This is another of the innumerable inventions describing gas turbine cycles composed of turbo-compressors, turbines, combustors, heat exchangers, and a means for taking off the useful load. It has for its object the providing of a clean fluid in the closed part of this cycle, which prevents fouling of the compressors and the heat exchangers. P. R. Trumpler

4. CARBONIZATION AND GASIFICATION

CO Removal

Ohme, W. AUSWASCHUNG UND GEWINNUNG VON KOHLENOXYD AUS KOHLENOXYDHALTIGEN GASEN. (SCRUBBING AND RECOVERY OF CARBON MONOXIDE FROM CO-BEARING GASES. *Gas- und Wasserfach* (German), 94, 645-647 (1953) November 1.

Experimental data on a laboratory scale scrubber employing either acidified or neutral copper chloride solutions demonstrate the feasibility of recovering 95%-purity CO from industrial gases. Operating results are included.
C. G. von Fredersdorff

Coal Handling

Bray, J. COAL HANDLING COSTS. *Coal-Heat*, 65, 26-28 (1953) November.

Comparisons of handling costs of coal by conveyor and by hand labor are given for retail coal yards. Railroad car and truck unloading, and truck and bin loading are compared in considerable detail. O. P. Brysch

Coal Hydrogenation

Pevere, E. F., Hess, H. V., and Arnold, G. B. (assigned to The Texas Co.) PROCESS FOR THE HYDROGENATION OF COAL. U. S. 2,658,861 (1953) November 10.

A process for hydrogenation of coal in a dispersed atomized stream of coal and oil at high pressures to produce liquid hydrocarbons.

G. V. Vosseller

Coal Pyrolysis

Ellis, C. SOME ASPECTS OF COAL PYROLYSIS. Inst. of Gas Engrs. (British) Publ. No. 436, (1953) November, 24-25; *Gas Times* (British) 77, 373-381 (1953) December 11; *Gas World* (British) 138, 1522-25 (1953) December 12; *Gas J.* (British) *Coke and Gas* (British), 15, 445-449 (1953) December.

For descriptive convenience and simplification, the phenomena of the pyrolysis of coal are grouped into four temperature regions: 1) predecomposition to 300°C.; 2) decomposition 300° to 550°C.; 3) semi-coke transformation, 550° to 1000°C.; and 4) structural ordering of coke, 1000° to 3000°C. Evolution of specific components and differential thermal analysis indicate that in Region 1 definite changes take place at characteristic temperatures. In Region 2, recent studies agree that the activation energy of decomposition is 50 K. cal. per mol. (as in breaking carbon-carbon bonds in petroleum cracking), with indications that reaction is unaffected by the solid or fluid state. In Region 3 the C-H bond breakage and devolatilization cause great contraction of the solid and thus dominate the fissuring and strength of the final coke. X-ray identification of grouped graphitic sheet units in ordinary coals and in the cokes of Region 4 shows a persistence of the unit and an increasing orderliness of structure with increase in temperature of treatment, as well as with increase in rank of coal. The separately published discussion treats the factors of evolution of oxygenated components, relation of coke cracking to coke-layer thickness, coal solubility in the volatiles, and influence of semi-coke agglomerates on viscosity.

O. P. Brysch

Gasification

Barr, F. T. and Nelson, K. J. (assigned to Standard Oil Development Co.) PRODUCTION OF WATER GAS. U. S. 2,657,986 and 2,657,987 (1953) November 3.

Gasification of coal for the production of carbon monoxide and hydrogen using the fluidized type of reaction is described. The coal is initially carbonized at lower temperatures than in conventional practice to produce a highly reactive coke. The tar which is distilled in the carbonization process is recycled back into the chamber by atomizing it onto the coke bed.

S. Mori

Kalbach, J. C. (assigned to Hydrocarbon Research, Inc.) GASIFICATION OF CARBONACEOUS MATERIALS CONTAINING VOLATILE CONSTITUENTS. U. S. 2,662,816 (1953) December 15.

An apparatus is presented for the carbonization of pulverized coal in a fluidized state followed by gasification of the char particles with oxygen and steam.

E. J. Pyrcioch

Mayland, B. J. (assigned to Phillips Petroleum Co.) METHOD FOR GASIFYING COALS. U. S. 2,659,668 (1953) November 17.

This invention deals with a method for gasifying pulverized low ash-fusion temperature coking coals whereby the coal is converted to a coke film on the surface of pebble-type heat-exchange material prior to gasification with oxygen and steam.

E. J. Pyrcioch

Gasification Kinetics

Goring, G. E., Curran, G. P., Zielke, C. W. and Gorin, E. KINETICS OF CARBON GASIFICATION BY STEAM. *Ind. Eng. Chem.*, 45, 2586-2591 (1953) November.

Two empirical rate equations in the C-H_2D system using low temperature char as the fuel are utilized to correlate the experimental data with the rate of total gasification and methane formation. The operating conditions ranged as follows: T = 1600°F., H_2 to H_2O ratio from 0.11 to 1.01, reactor pressure from 0.99 to

29.9 atm., percent carbon gasified from 0 to 50%. The results of the tests show that methane can be formed from the direct interaction of carbon with steam. The water-gas shift equilibrium is not reached at this temperature, and the CO_2 : CO ratio is a function of the intensive variables only. S. Mori

Hydrogen Manufacture

Johnson, W. B. (assigned to The M. W. Kellogg Co.) MANUFACTURE OF HYDROGEN. U. S. 2,656,255 (1953) October 20.

Hydrogen is produced by reacting steam with a finely divided metal at a temperature of about 1100°F. The oxidized metal is brought back to its reduced state following a reaction with a gas rich in carbon monoxide that is produced by coal gasification. E. J. Pyrcioch

Mine Methane Recovery

Venter, J. and Stassen, P. DRAINAGE AND UTILIZATION OF FIREDAMP. U. S. Bur. Mines Information Circular 7670 (1953) November.

The Belgian authors discuss the origin and nature of firedamp (methane) in coal seams, then give a review of the recovery and utilization of methane from coal mines of Belgium, Germany, Britain, France, and Netherlands, which are now producing over 12 billion CF per year. A bibliography of 90 references is given.
O. P. Brysch

Oil Gas—Continuous

TPC—LATEST ROAD TO HIGH-BTU. FUEL GAS. *Chem. Eng.*, 60, 122, 124, 126, 128 (1953) November.

Surface Combustion Corp.'s new continuous thermofor pyrolytic cracking process pilot plant is described. It consists essentially of coke pebble-heaters utilizing a moving bed of solid particles for transferring heat. A side-stream of the coolest pebbles is cooled further in a heat exchanger, after which it joins the main stream in the reactor. Cracked products are removed from the reactor through this side stream, and pitch deposition is a serious problem. Excess solid material, caused by buildup of carbon on the pebbles is constantly removed. Reaction conditions can be chosen so as to favor the wintertime production of peak load gas interchangeable with natural gas, and the summertime production of valuable byproducts.
J. J. Guyer

Oil Gas—Cyclic

Born, P. L. (assigned to The Gas Machinery Co.) OIL GAS PROCESS AND APPARATUS. U. S. 2,663,625 (1953) December 22.

This patent describes cyclic equipment for peak load production of high-Btu oil gas interchangeable with natural gas, using an oil flame instead of a solid fuel bed as heat source. The process also permits modification of existing sets to produce interchangeable gas at full capacity. Checkerbrick protects the grate and imparts turbulence to the combustion air which passes up through it. Heavy fuel oil is sprayed horizontally into the combustion chamber above the checkerbrick. Excess combustion air is blown up through the checkerbrick, above which it mixes with and burns the oil spray. Combustion gases heat the checkerbrick in the carburettor and superheater, and the excess air burns off the carbon deposited during the previous cycle. Light fuel oil is sprayed into the top of the combustion chamber and carburettor during the gas-making phase of the cycle. The make-gas is swept through and out of the system by steam, which is fed through the checkerbrick in the bottom of the combustion chamber. Steam decomposition is negligible, as there is no fixed bed of incandescent carbon for it to pass through. When a low-Btu gas set using a bed of solid fuel produces high-Btu oil gas, the necessary reduction of water gas content in the product gas results in undercooling of the fuel bed and overcooling of the checkerbrick, and consequent lowering of the output of the set. The process claimed permits the set, after modification, to produce high-Btu oil gas at capacity. After the gas-making phase of the cycle is completed, the heavy fuel oil spray is ignited by a pile of ceramic material at one side of the combustion chamber, mounted on the checkerbrick so that it stays hot during the gas-making phase. J. J. Guyer

Reforming Catalysts

Drake, L. C. and Smith, R. L. (assigned to Socony-Vacuum Oil Co.) REFORMING CATALYST AND METHOD FOR PREPARING THE SAME. U. S. 2,658,931 (1953) November 10.

A method of producing a reforming catalyst is described which comprises effecting the thermal decomposition of an alkali metal chromocyanide in an oxygen-free atmosphere and backing the product of decomposition with metal free of soluble matter. This catalyst is claimed to be an improvement over the present catalysts used in reforming of petroleum hydrocarbon. The catalyst consists of essentially chromium, carbon, nitrogen, and oxygen.

H. A. Dirksen

Heard, L. and Den Herder, M. J. (assigned to Standard Oil Co.) SOLUBILIZED PLATINUM SULFIDE REFORMING CATALYST. U. S. 2,659,701 (1953) November 17.

The preparation of platinum catalysts for the continuous hydroforming of hydrocarbons is described and the claim is made for long life without regeneration in the continuous hydroforming of naphthas, gasolines, and the hydrocarbons. A platinum compound, such as an aqueous solution of chloroplatinic acid containing from about 0.1 to 10 grams of platinum per liter, preferably around 3.5 grams of platinum per liter, is contacted with an ammonium sulfide solubilizing agent. The platinum is converted thereby into a solubilized form of platinum sulfide in aqueous solution, which remains stable indefinitely. This solution, which may be a true solution or a colloidal solution, is combined with alumina and optionally with a cracking catalytic adjuvant such as silica or a halogen, and the mixture is dried and calcined.

H. A. Dirksen

Smokeless Fuel

Jennings, R. J. SMOKELESS FUEL MANUFACTURE: PLANTS AND PROCESSES FOR CARBONIZING BRIQUETTED COAL. *Chem. Process Eng.* 34, 343-49 (1953), November.

Utilization of increasing proportions of fine coal and of non-coking coals, and reduction of air pollution by increased use of smokeless fuels has led to considerable interest in carbonization processes. Commercial-scale briquet carbonizing processes are described. These include the Phurnacite, Carmaux, Brennstoff-Technik, Krupp-Lurgi, Lurgi-Spulgas, Didier and Otto. Experimental work on the Weber hot-sand, Norsk-Hydro electrical and Hodsman lime-tar process also are given. O. P. Brysch

Stillman, A. L. (Fuel Research Corp., N. Y., N. Y.) METHOD OF MANUFACTURING BRIQUETTES. U. S. 2,661,326 (1953), December 1.

Bituminous or semi-bituminous coal is heat-treated at 350° to 450°F. for 10 minutes, ground to pass 60-mesh, mixed with 5-10% mineral pitch and 15% pulverized ligneous material, and the mixture is filled into partitioned trays of cellulosic material. The filled trays are carbonized at 1000°F. in a closed retort until filling and tray sustance are converted to a smokeless char, the charred partitions permitting separation of the coke into individual briquettes.

O. P. Brysch

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Flow Control

Baird, R. D. MOBILE RESEARCH LABORATORY. *Petroleum Eng.*, 25, C29-37, (1953), November.

The design, construction, and instrumentation of a mobile research laboratory used for making field measurements in acoustics, vibration, and pulsative fluid flow are discussed, with special reference to the instrumentation involved and the range of its capabilities.

Author's Abstract

Rufleth, W. E. TELEMETERING AND REMOTE CONTROL OF GAS FLOW. *Petroleum Eng.*, 25, D4-6, (1953) October.

The pipe line system for New England is briefly described. Since the required load changes

with time it is necessary to make adjustments. Telephone circuits are used to transmit pressures and to reset the automatic differential pressure controllers. Numerous long distance circuits would normally be required for a system of this type, but a time-multiplex transmitter and receiver is used which discriminates the signals thus reducing the number of circuits required. W. W. Clauson

Gas Dehydration

Gordon, J. A. LIQUID DESICCANT DEHYDRATION PLANTS. *Petroleum Eng.*, 25, A74-86 (1953) November.

Plant operating problems encountered in gas dehydration plants using glycol are fully discussed. (Note: Fig. 1 should have *Temperature* as ordinate and *Pressure* as abscissa instead as printed. D. C. Gami

Gasoline Estimation

Miller, S. G. HOW TO PREDICT NATURAL-GASOLINE CONTENT OF PRODUCED FLUIDS FROM FIELD SEPARATION DATA. *Oil Gas J.*, 52, 85, 87-89 (1953) November 23.

Several hundred wells in the Long Beach Harbor area of Wilmington field in California have had their separation changed in the past several years from trap separation at 30 to 100 psig. to casing-gas separation at 0 to 30 psig. These wells represent wide variations of gravities, gasoline contents, gas-oil ratio, productivity index, production and reservoir depletion. The large amount of data accumulated in this connection has been correlated to make possible estimation of natural-gasoline liquids production. The broad limits covered by the data on which this correlation is based may make the findings of value for predictions in other areas. Author's Abstract

Hydrostatic Testing

Brooks, L. "PACKAGED" TECHNIQUE FOR HYDROSTATIC TESTING OF PIPELINES. *Gas*, 29, 95-100 (1953) December.

The equipment and procedure used by one company in its complete hydrostatic testing program for gas pipelines, which it offers to the industry on a contract basis, is described in detail. One 24-in. line, 308 miles in length, was tested by this company and was ready for service within 48 hours after final tie in. Standards for determining whether a section of pipe is sufficiently leak-proof are not presented. H. C. Owen

Line Pipe Storage

Orvis, W. C. THIS HOLDER, 12 MI. LONG, 16 IN. DIAMETER, SOLVED A STORAGE-TRANSMISSION PROBLEM. *Gas Age*, 112, 15, 16 (1953) November 5.

Improved economical use of line pipe for storage is being attempted by Southern Counties Gas Co. where a 12-mile section of pipe is being laid to serve for the present as a holder to equalize the hourly load on an existing line and for the future to supplement the transmission capacity. R. F. Bukacek

LP-Gas Uses

Nemmers, R. J. THE STORY OF LP-GAS. *Compressed Air*, 58, 330-337 (1953) December.

A brief history of LP-gas is given ranging from home consumption through automotive fuel. Engineering problems of storage, handling, regulators and valves are discussed. Advantages and economics as an automotive fuel, industrial applications and utility gas peak-load supplement are covered. A description of a typical LP-gas distribution operation is included. C. E. Pierson

Powell, J. H. PROPANE BUS FLEET SHOWS BIG SAVING IN FUEL COST. *Liquefied Petroleum Gas Assoc. News Letter*, 5, No. 12, p. 4 (1953) December.

At a national meeting of the Society of Automotive Engineers on Nov. 8 in Chicago the Assistant to the President, San Antonio Transit Co., San Antonio, Tex. said: "When the price of propane is 5 cents per gallon cheaper than gasoline the conversion of transit equipment to LP-gas is warranted. Although this figure is a very rough rule of thumb given some credence in the transit industry, the answer is different for each location. The San Antonio company started its conversion program with the purchase of 30 propane buses in 1951. Subse-

quently 112 gasoline buses bought earlier were switched over to LP-gas. Thirty new propane units, purchased in 1952 brought the total to 172 vehicles about 57% of the fleet. Since 1951 these buses have operated 18,000,000 miles with the fuel savings compared to gasoline of 1 to 1½-cents per mile. At a 1½-cent average, the gross saving amounted to $225,000. . . . Maintenance savings, reduced oil costs, servicing savings, etc. are an added bonus which have not been included in these figures."

Author's Abstract

LP-Gas Storage

Boyd, J. W., Richardson, J. O. and Roach, D. A. HOW TO TRANSPORT AND STORE PROPANE ON A PRODUCTS PIPE-LINE SYSTEM. *Oil Gas J.*, 52, 220-22, 320 (1953) November 16.

The overall transportation and storage system of the 950-mile Phillips Pipeline Company, from Borger, Texas to E. Chicago, Indiana is described. Storage facilities include above-ground pressure tanks, underground pipe section batteries and an underground mined cavern, the coordinated use of which delivers high specification propane to the Chicago industrial area as well as to major points along the line.

J. M. Reid

Phelps, R. V. (assigned to Warren Petroleum Corp.) UNDERGROUND LIQUID STORAGE FACILITY AND THE METHOD OF SELECTING AND PREPARING THE SAME. U. S. 2,659,209 (1953) November 17.

A method of constructing an underground mined cavity suitable for storage of LP-gas is described. J. M. Reid

Main Laying

Symons, G. E. HOW PUBLIC SERVICE IS LAYING 257 MILES OF MAIN IN NEWARK EXPANSION. *Gas Age*, 112, 17-19, (1953), December 3.

A brief description of the program of Public Service of New Jersey for extending gas mains, and information concerning their technique in laying 42" cast-iron mains. R. F. Bukacek

Measurement

Penick, D. C. HOW TO SOLVE PROBLEMS IN GAS MEASUREMENT. *World Oil*, 137, 194, 196, 200, 202, 205 (1953) November.

A discussion of the problem of metering the intermittent gas flows involved in gas-lift operations and methods of improving the accuracy of such metering by the use of fast chart drives. R. F. Bukacek

Mobile Compressors

McRoberts, E. S. ECONOMICS OF PACKAGED COMPRESSOR PLANTS. *Petroleum Eng.*, 25, E4, 6, 10, 12, 13, E16, (1953) November.

Packaged compressor plants fully assembled at the factory and compact enough to be transported on oil-field trucks are finding increased use in oil and gas production. The compressors with ratings up to 550 Hp can be used as single units or in banks of units. Lower initial and reduced operating and maintenance costs are claimed over the permanent compressor installation. E. J. Pyrcioch

Organic Sulfur

ORGANIC SULPHUR REMOVAL. *Gas Times* (British) 77, 244-45 (1953) November 13; *Gas J.* (British), 276, 461-62 (1953) November 18; *Coke and Gas* (British), 15, 462-4 (1953) December.

The Griffith process for removal of organic sulfur from coal gas has now been made available for licensing. Mercaptans, carbon disulfide, and carbon oxysulfide, but not thiophene, are removed by catalytic oxidation to sulfur dioxide with oxygen. D. M. Mason

Overpressure Protection

A SYMPOSIUM ON MEASURES TO PREVENT OVER-PRESSURE OF GAS SYSTEMS. *Gas Age*, 112, 32-35, (1953) November 5.

The advantages and disadvantages of mechanical relief devices, automatic shut-off valves, and oil seals for over-pressure protection on distribution systems are presented. The methods of determining the size and location for the

devices as used by the different companies, are explained, and the reasons for favoring the use of the particular protection scheme on each system is outlined. B. E. Eakin

Pipeline Cleaning

Hadley, R. F., Daugherty, J. G. and Young, F. A. (assigned to Sun Oil Co.) PIPELINE CLEANING AND POLISHING DEVICE. U. S. 2,657,506 (1953) November 3.

This invention relates to an apparatus for internally cleaning pipelines and is directed particularly to a device which, in addition to removing accumulated matter from the inner surfaces of the pipe functions also to polish the internal surface of the pipe by use of spring-loaded scraping elements. B. E. Eakin

Pressure Reduction

Kerr, T. H. and Smith, E. E. CALCULATION OF HEAT REQUIREMENTS TO PREVENT EXTERNAL FREEZING OF PIPING. *Gas*, **29**, 36-41 (1953) December.

Using the generalized Beattie- Bridgman equation of state, the enthalpy of natural gas (94.5% CH_4, 3.5% C_2H_6, 1.0% C_3H_8, 0.5% CO_2 and 0.5% N_2) for temperature from 20° to 220°F. and pressure from 0 to 2000 psig are calculated. It is claimed these data can be used for natural gas containing 96 to 92% methane and 3 to 6% ethane and higher compounds. They simplify the calculation of the heating requirements to offset the refrigeration due to reduction of pressure and to prevent external freezing of piping and regulators. D. C. Gami

Reservoir Engineering

Hetherington, G. and McDowell, J. M. GAS-CONDENSATE RESERVOIRS. *Petroleum Eng.*, 25, B107, 08, 10, 12, 14-16, 18-B20 (1953) November.

Several methods of exploiting a gas-condensate reservoir were investigated for assumed conditions. The principle of exponential permeability stratification was applied to the recoveries determination during the cycling programs. The three investigated were 1) cycling and dewpoint followed by blowdown to abandonment, 2) partial pressure reduction and recycling and the reduced pressure, followed by blowdown, and 3) pressure depletion from the beginning. The results for the specific conditions assumed the indicated dewpoint cycling as being most economical. However, it is quite likely that for different conditions and prices the results could be entirely changed. It is therefore concluded that each case should be investigated separately to determine the optimum method of economic exploitation. Rather complete calculations and results are presented. B. E. Eakin

Thermal Reforming

Patterson, W. S. (assigned to Combustion Engineering, Inc.) BURNER FOR CONVERTING NATURAL GAS INTO GASOLINE COMPONENTS. U. S. 2,660,235 (1953) November 24.

A water-cooled burner for converting natural gas or gaseous hydrocarbons to light liquid hydrocarbons. G. V. Vosseller

Underground Storage

Studt, C. W. UNDERGROUND GAS STORAGE RIGHTS. Paper No. OS-53-9 Amer. Gas Assoc. Operating Section, St. Louis, (1953) October 26; *Amer. Gas Assoc. Monthly*, 35, 31-33, 45 (1953) November.

Property rights necessary for the successful operation of an underground storage reservoir are discussed in the light of the minimum legal protection that an operator should have before undertaking such a venture. The extent of coverage which surface, subsurface and oil and gas rights must provide and their methods of acquisition are pointed out, taking into consideration the legal differences which exist between states. J. M. Reid

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Lenoir, J. M. THERMAL CONDUCTIVITIES OF GASES AT HIGH PRESSURE. p. 34

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Cracking Processes

Dickerman, W. C., Jr. THE PRESENT STATUS OF THE ART OF CRACKING PETROLEUM FRACTIONS. *J. Inst. Petroleum*, 39, 765-794 (1953) November.

This (April 8, 1953) Institute of Petroleum paper comprises a history of the increase in demand for petroleum products in the U. S. and the United Kingdom, 1921-1951. It includes graphs; a review of the various thermal processes, with comments on their present status; a discussion of catalytic processes, with special attention given to cracking; and an outline of the application of cracking to refinery requirements. In the discussion of catalytic cracking are included the following, with flow diagrams: moving bed, airlift TCC, Houdri-flow, and fluid processes, as well as descriptions of the Universal Oil Products and Ortho flow fluid cracking units. J. J. Guyer

Fischer-Tropsch

Rottig, W. (assigned to Ruhrchemie A-G., Germany) CATALYTIC HYDROGENATION OF CARBON MONOXIDE. U. S. 2,660,599 (1953) November 24.

Catalytic hydrogenation of carbon monoxide is proposed using an alkalized iron-copper catalyst in reduced state operating at 190° to 320°C. and pressures between 10 and 50 atmospheres. C. G. von Fredersdorff

THE SASOL OIL-FROM-COAL PLANT. *Gas Times*, 77, 315, 316 (1953) November 27.

On a government-financed ($85 million) undertaking near Johannesburg, Transvaal, the South African Synthetic Oils, Ltd. will produce 63,300,000 gallons of liquid hydrocarbons, 9,000 tons of ammonia and 14,000 tons of wax from synthesis gas produced in Lurgi pressure gasifiers and converted by Fischer-Tropsch catalysts in fixed and circulating beds. By-products can be varied depending upon market demands. G. V. Vosseller

Oil Black

Heller, G. L. (assigned to Columbian Carbon Company) PROCESS FOR PRODUCING CARBON BLACK. U. S. 2,659,662 (1953) November 17.

This patent describes a process for producing carbon black from heavy liquid hydrocarbons. The hydrocarbon is sprayed into a hot turbulent gas stream in a cylindrical furnace downstream from the point of entry of blast-flame gases. Excessive coking is eliminated by a spray nozzle design which incorporates a heat exchanger to keep the hydrocarbon feed below its decomposition temperature. M. Quinn

Heller, G. L. (assigned to Columbian Carbon Company) PROCESS FOR PRODUCING CARBON BLACK. U. S. 2,659,663 (1953) November 17.

A refinement of U. S. 2,659,662. A process for producing carbon black from heavy liquid hydrocarbons. In this case the cooling medium is used also as an atomizing medium for the feed hydrocarbon. In short this involves a two-fluid nozzle with the atomizing fluid acting also as heat exchange medium. M. Quinn

Oil Imports

Lyons, C. H. IMPORTS: AN INDUSTRY PROBLEM. *Independent Petr. Assoc. Amer. Monthly*, 24, 32, 33 (1953) November.

A very enlightening discussion on the import problem by the President of the Independent Petroleum Association of America in which he emphasizes the need for a voluntary action by all concerned before the government deems it necessary to legislate controls. B. E. Eakin

Oil Pipe Lines

PIPE-LINE RECORDS FALL IN '53. *Oil Gas J.*, 52, 50-2, (1953), November 23.

Approximately 8700 miles of crude oil and products lines will be completed in 1953, including 643 miles of 30″ line, the largest diameter crude oil line in the country. The cost of this expansion is estimated in excess of $480,000,000. R. F. Bukacek

7. ANALYTICAL METHODS AND TESTS

Mass Spectrometry

Newton, A. S. MASS SPECTROMETRIC DETERMINATION OF GAS IMPURITIES SEPARABLE BY CONDENSATION. *Anal. Chem.*, 25, 1746-49 (1953) November.

A method for the determination of non-condensable impurities in condensable gases is described. The condensables are removed in such a manner that solubility of the non-condensables is minimized, and the separated components are subsequently analyzed with a mass spectrometer. D. V. Kniebes

Radioactivation

Brooksbank, W. A., Leddicotte, G. W. and Mahlman, H. A. ANALYSIS FOR TRACE IMPURITIES BY NEUTRON ACTIVATION. *J. Phys. Chem.*, 57, 809-814 (1953) November.

The application of radioactivation analysis to selected examples of trace element determinations is reported. The technique of the method of neutron radioactivation analysis and the sensitivities of detection of these elements in a variety of materials are discussed.

Authors' Abstract

Spectrography

Key, C. W. and Hoggan, G. D. DETERMINATION OF TRACE ELEMENTS IN FUEL OILS. *Anal. Chem.*, 25, 1673-76 (1953) November.

A vertical rotating disk method, in an inert gas atmosphere, is described, for the direct spectrographic determination of vanadium, sodium, nickel, calcium in fuel oil (Bunker C particularly) without special prior preparation of the sample. The method consumes approximately 40 minutes compared to the conventional ashing-chemical analysis method of at least 16 hours and eliminates steps which can introduce error and contamination. Precision and sensitivity comparable to the time consuming methods are claimed. Special adjusting of the photographic film of the spectrograph is required. R. R. Amrine

Rozsa, J. T. and Zeeb, L. E. FAST SPECTRO METHOD FOR TRACE DETERMINATIONS IN LUBE OILS. *Petroleum Processing*, 8, 1708-12 (1953) November.

A horizontal rotating disk method for the direct spectrographic determination of contaminates in lube oil for diesel engines is described. The lube oil, after the addition of a buffer and internal standard, is dried to a tar-like consistency on a graphite disk on a hot plate. A unidirectional arc is used and 17 elements have been quantitatively analyzed for. The method is clean, only 25% of the time of other methods is claimed, introduction of error and contaminates are eliminated, and the entire sample is introduced into and kept in the arc during excitation. R. R. Amrine

Surface Phenomena

Wahba, M. and Kemball, C. HEATS OF ADSORPTION OF AMMONIA AND HYDROGEN ON METAL FILMS. *Faraday Soc. Trans.* (British), 49, 1351-1360 (1953) November.

The heats of adsorption of ammonia and hydrogen at 21°C. on evaporated metallic films of nickel, iron and tungsten were measured calorimetrically. In all cases there was a marked decrease in the heat of adsorption as the coverage of the surface was increased. The heat of adsorption of ammonia was greater than the heat of adsorption of hydrogen except on nickel films with a substantial coverage of adsorbed molecules. As the adsorption of ammonia was slightly slower than that of hydrogen it is suggested that a small activation energy is required for the dissociative adsorption of ammonia. Corrections had to be made for the adsorption and desorption of ammonia at the glass walls of the apparatus. Iron and tungsten films bearing a substantial coverage of ammonia evolved a permanent gas at first rapidly and then more slowly. This was assumed to be hydrogen, and the amount formed from a known amount of adsorbed ammonia indicated that some dissociation to adsorbed NH radicals or N atoms was taking place.

Authors' Abstract

Sulfur Determination

Battles, W. R. RAPID METHOD FOR DETERMINATION OF SULFUR IN GASOLINE. *Petroleum Eng.*, 25, C47-49, C52 (1953) November.

A lamp method for determination of sulfur in gasolines which requires an average time of 10 min. and yields results with an average error of less than 3% of the amount of sulfur present is described. Only about 0.2 ml. of gasoline is burned per determination.

D. M. Mason

White, T. T., Penther, C. J., Tait, P. C. and Brooks, F. AUTOMATIC COMBUSTION APPARATUS FOR DETERMINATION OF SULFUR AND HALOGEN. *Anal. Chem.*, 25, 1664-68 (1953) November.

A thermocouple located in the combustion zone of an automatic quartz-tube combustion apparatus for organic materials percieves the heat generated by the combustion of the sample vapors. By means of an amplifier and relay switch the thermo electric output controls the rate of sample vaporization. The wiring diagram is presented. D. J. Dennison

Tar Composition

Harris, A. S., White, E. N. and McNeil, D. THE CHEMICAL COMPOSITION OF HIGH-BOILING FRACTIONS OF COAL TAR. I. A STEAM DISTILLATE FROM A VERTICAL-RETORT SOFT PITCH. *J. Appl. Chem.* (British), 3, 443-450 (1953) October.

A chromatographic method is employed to separate a neutral oil boiling above 380°, 760 mm, into paraffin waxes, fluorescent oils, solids, and known residual oils. The chief components of each of these groups is listed. E. Mann

8. GENERAL AND PHYSICAL CHEMISTRY

Carbon Properties

DeSorbo, W. and Tyler, W. W. THE SPECIFIC HEAT OF GRAPHITE FROM 13° to 300°K. *J. Chem. Physics*, 21, 1660-63, (1953) October.

The specific heat of graphite was determined experimentally for temperatures ranging from 13 to 300°K. The resulting data was used to calculate other thermodynamical functions such as enthalpy, entropy and free energies.

S. Mori

Friedel, R. A. and Pelipetz, M. G. INFRARED SPECTRA OF COAL AND CARBOHYDRATE CHARS. *J. Opt. Soc. Am.*, 43, 1051, 1052 (1953) November.

Infrared spectra of the anthraxylon constituent of bituminous coal are compared with the spectra of cellulose char and sugar char. The similarity of the spectra indicates the presence of definite molecular configurations in the chars and lends valuable support to the theory that cellulose is an important procursor of coal. Authors' Abstract

Gaylord, W. M. CARBON AND GRAPHITE. *Ind. Eng. Chem.*, 45, 2182-2184 (1953) October.

Considerable data on the physical properties of graphite at refractory temperatures have been published in the past 2 years. They amplify the earlier disclosures of the increase in strength of graphite at elevated temperatures. The mechanical design of all types of impervious graphite equipment has received appreciable attention, particularly equipment connections. These improvements and new manufacturing economies in fabricating equipment add impetus for expanded applications. Motion pictures have been produced covering all phases of impervious graphite chemical process equipment. Author's Abstract

Mooi, J., Pierce, C. and Smith, N. HEATS AND ENTROPIES OF ADSORPTION ON A HOMOGENEOUS CARBON SURFACE. *J. Phys. Chem.*, 57, 657-59, (1953), October.

Six isotherms for the adsorption of ethyl chloride on graphon, (a carbon of unusually homogeneous surface) ranging from —78 to 75.2°C. was obtained experimentally. The isosteric heats were calculated by using the Clausius-Clapeyron equation while entropies of adsorption was calculated by still another method.

S. Mori

Catalyst Properties

De Lollis, N. J. (assigned to the United States of America) METHOD OF PREPARING NICKEL POWDER WITH LARGE SURFACE AREA. U. S. 2,660,523 (1953) November 24.

The present invention relates to the production of nickel powder with a very large surface area. In the present invention nickel oxalate is decomposed at a temperature well below the melting and sintering temperatures of the metal and below the melting point of the nickel salt. The volatile gases leaving the rigid structure of the nickel salt leave it in a very porous state resulting in a large surface area. Surface areas up to 54 square meters per gram have been obtained. H. A. Dirksen

Cryogenic Research

NOW—CRYOGEN HYDROGEN *Chem. Eng.*, 60, 134, 136, 138, 140, 141 (1953) November.

Wider use of extremely low temperatures in both industry and national defense has given rise to many new and highly complex engineering problems. Chief among these are the problems due to the unusual behavior of engineering materials at low temperatures. In order to study properties of matter at low temperatures and to develop equipment and techniques for low-temperature processes the government has recently spent $3½ million for a new Cryogenic Engineering Laboratory at Boulder, Colo. It was opened in late summer. Extract

Gas Solubilities

Burrows, G. and Preece, F. H. CORRELATION OF THE SOLUBILITIES OF GASES IN LOW-VAPOR-PRESSURE LIQUIDS BY AN EVAPORATION ANALOGY. *J. Appl. Chem.* (British), 3, 451-462, (1953) October 3.

On the basis of similarities between the evolution of gas from the liquid and evaporation of vapor from pure liquid the authors derive an expression for the solubility of gas in liquid. This equation is similar in form to Clausius-Clapeyron equation, where Ostwald's solubility coefficient is substituted for the pressure term. This theory is confirmed by the experimental solubility data of helium in 3 liquids and the literature data in the solubility of air in lubricating and aircraft engine oils.

D. C. Gami

Nitrogen Fixation

Daniels, F., (Wisconsin Alumni Research Foundation). PROCESS FOR THE PRODUCTION OF NITROGEN OXIDES. U. S. 2,657,-116, (1953), October 27.

A heated bed of highly refractory pebbles is used to generate nitrous oxide from air. The product is immediately chilled in a second bed of pebbles to prevent further reversal of the reaction. When the second bed temperature becomes adequate for the reaction to take place the cycle is reversed so that the reaction takes place in the second pebble bed and chilled in the first. S. Mori

Hendrickson, W. G. and Daniels, F. FIXATION OF ATMOSPHERIC NITROGEN IN A GAS HEATED FURNACE. *Ind. Eng. Chem.*, 45, 2613-2615 (1953) December.

To overcome the difficulties arising from the deterioration of the refractory material for the nitrogen fixation reactor operable at 2200°C., various refractories and techniques in construction of the insulating material were investigated. A MgO brick was developed which withstood these temperatures for about 70 hours, and further contact with the reactants caused deterioration by the vaporizing of this material. This problem is still in the process of investigation by the authors. S. Mori

Oxide Formation

Hoch, M. and Johnston, H. L. FORMATION, STABILITY AND CRYSTAL STRUCTURE OF SOLID SILICON MONOXIDE. *J. Amer. Chem. Soc.*, 75, 5224-25 (1953) November 5.

Investigation of the formation of SiO reaction was facilitated by the use of a high-temperature X-ray diffraction instrument. The diffraction pattern for SiO was obtainable at temperatures above 1300°C. Below this, the specimen decomposed to SiO_2 and Si, indicating its instability at lower temperatures. S. Mori

Thermal Conductivities

Lenoir, J. M., Junk, W. A. and Comings, E. W. MEASUREMENT AND CORRELATION OF THERMAL CONDUCTIVITIES OF GASES AT HIGH PRESSURE. *Chem. Eng. Progress*, **49**, 539-542, (1953) October.

Data are presented for methane, ethane, nitrogen, and argon. A thermal conductivity ratio was plotted as a function of reduced pressure using reduced temperature as a parameter; previous results for ethylene and carbon dioxide are also plotted. A new correlation was prepared using these data. An unexpected irregularity was experienced with ethane, 99.0% purity, in the region of the critical point. W. W. Clauson

Weeks, J. L. and Seifert, R. L. APPARATUS FOR THE MEASUREMENT OF THE THERMAL CONDUCTIVITY OF SOLIDS. *Rev. Sci. Instruments*, **24**, 1054-1057 (1953) November.

This apparatus for measuring the thermal conductivity of solids claims an accuracy of ± 3 percent in a temperature range from 40 to 100°C. Based on the same principle as that of Van Dusen and Shelton, it presents the advantages that small quantities of sample can be measured and the assembly can be readily adapted to remote-control operations.

S. Sensi

Thermodynamic Properties

Hu, J. H., White, D. and Johnston, H. L. CONDENSED GAS CALORIMETRY. V. HEAT CAPACITIES, LATENT HEATS AND ENTROPIES OF FLUORINE FROM 13 TO 85°K.; HEATS OF TRANSITION, FUSION, VAPORIZATION AND VAPOR PRESSURES OF THE LIQUID. *J. Amer. Chem. Soc.*, **75**, 5642-5645, (1953) November 20.

Heat capacity and vapor pressures of fluorine from 14 to 85°K. are reported. Computed thermodynamic functions from 0 to 85°K. are presented in tabular form. Values calculated from spectroscopic data are in good agreement with the calorimetric values. D. C. Gami

Rathjens, G. W., Jr. and Gwinn, W. D. HEAT CAPACITIES AND ENTROPY OF CYCLOBUTANE. *J. Amer. Chem. Soc.*, **75**, 5629-5633, (1953) November 20.

Heats of fusion and vaporization and heat capacities of solid and liquid cyclobutane from 14°K. to 283.67°K. (boiling point) have been obtained. Vapor pressure data obtained for the liquid are represented by an equation. A transition at about 145°K. is investigated.

D. C. Gami

X-Ray Camera

Marsden, S. S. and Sanjana, N. R. A NOVEL X-RAY DIFFRACTION HEATING CAMERA. *J. Sci. Instruments* (British), **30**, 427-29, (1953), November.

An X-ray camera for low-angle scattering applicable to samples at elevated temperature is described. It is especially useful to measure the Debye-Scherrer lines of liquids. These lines are observable below the melting point of the particular substances. S. Mori

9. ORGANIC CHEMISTRY

Coal Aromatics

AROMATICS FROM COAL. *Chem. Engrg.*, **60**, 250-253, (1953) December.

The Carbide and Carbon Chemicals Co. coal hydrogenation pilot plant recently put into operation is capable of producing aromatic chemicals in large quantities without the use of coking operations. A pulverized coal pasted with aromatic oil and with a catalyst is reacted with hydrogen at temperatures of 840-1000°F. and pressures of 4,000-6,000 psi. A flow-sheet of the process is presented. E. J. Pyrcioch

Gas Chemicals

NATURAL GAS TO ALCOHOL. *Oil Gas J.*, **52**, 60-64 (1953) November 30; *Chem. Eng. Progress*, **49**, 18, 22, 26 (1953) December.

The National Petro-Chemical Co. plant at Tuscola, Ill. is described. This plant jointly owned by National Distillers Products Corp. and Panhandle Eastern Pipeline is producing alcohol, ethylene and ethyl chloride from petroleum fractions recovered from the natural gas taken from the lines of Panhandle Eastern.

W. G. Bair

Molecular Volume

Quayle, O. R. THE PARACHORS OF ORGANIC COMPOUNDS: AN INTERPRETATION AND CATALOG. *Chem. Rev.*, **53**, 439-589 (1953) December.

The study of the parachor and the surface tension as related to molecular volume of liquids is reviewed from Sugden in 1924 to date. The applications of this constant in research on molecular structure is of particular interest in the case of hydrocarbons. Relationships to other properties, modified treatments of data for various compounds and experimental methods are discussed. A 96-page catalog of compounds is compiled and 255 references are cited.

O. P. Brysch

10. CHEMICAL ENGINEERING

Gas-Solids Reactor

Symonds, F. L. (assigned to Standard Oil Co.) REACTION FURNACE FOR CONTACTING A GAS AND FLUIDIZED SOLIDS. U. S. 2,656,258 (1953) October 20.

A rectangular and circular furnace divided into several compartments is proposed for continuously contacting gases with fluidized solids, with provision being made for circulating the solids from one compartment to another by a system of hydraulic lifts.

C. G. von Fredersdorff

Materials Handling

Bogot, A. and Bishop, H. A. (Combustion Engineering, Inc., N. Y., N. Y.) DETECTION OF STOPPAGE IN THE FLOW OF DIVIDED MATERIAL. U. S. 2,659,881 (1953) November 17.

Various arrangements of indicators for detecting the flow of solids in closed conduits, such as by sensing rods and sound responsive devices are proposed in this invention.

C. G. von Fredersdorff

Richardson, I. H. TREND TOWARD AUTOMATION IN AUTOMATIC WEIGHING AND BULK MATERIALS HANDLING. *Mech. Eng.*, **75**, 865-70 (1953) November.

The early development of automation in bulk-materials handling and weighing is traced. Examples of its applications in various industries are cited as an indication of the success of this form of automatic control. E. J. Pyrcioch

Pressure Tanks

Reynolds, T. W. METAL THICKNESS OF STEEL TANKS. *Heating & Ventilating*, **50**, 84-87, (1953) December.

Various standard formulas for calculating shell and head thicknesses for pressure vessels are reviewed, with examples.

C. G. von Fredersdorff

Thermodynamic Properties

Corrigan, T. E. CHEMICAL ENGINEERING FUNDAMENTALS. *Chem. Eng.*, **60**, 203-207 (1953) November.

Since the September 1953 issue, the author has presented a three-part review of thermodynamic principles. This third part deals with the calculation of thermodynamic properties such as enthalpy and entropy of gases and gas mixtures, using generalized charts based on the law of corresponding states.

D. C. Gami

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Flow Measurement

Hougen, J. O. PREDICTION OF GAS-FLOW PERFORMANCE OF ROTAMETERS. *Instruments*, **26**, 1716, 37, (1953) November.

A generalized calibration method is developed for rotameters where freedom from drag-coefficient variations exist. R. F. Bukacek

Partridge, F. M. PROGRESS IN LARGE VOLUME MEASUREMENT. *Gas*, **29**, 98, 100, 102 (1953) November.

A report on the installations and testing projects for orifice meter runs that have been in progress for the past few years with a report on the large-diameter orifice testing at Refugio. B. E. Eakin

Voils, R. M., Jr. CALCULATION OF LIQUID FLOW COEFFICIENTS. *Instruments*, 26, 1731-35, (1953), November.

A deviation of the basic orifice-flow equations and the necessary correction factors.

R. F. Bukacek

Industrial Ultrasonics

Arnold, M. H. ULTRASONICS IN INDUSTRY A CRITICAL ASSESSMENT. I. METHODS OF GENERATION. *Chem. and Process Eng.*, (British), 34, 360-62 (1953) November.

This is the first of a series which will evaluate the uses of ultrasonics in industry. Methods of ultrasonic energy generation are discussed in this article.

D. V. Kniebes

12. MATERIALS OF CONSTRUCTION

Cement Linings

Resen, F. L. HOW TO CEMENT-LINE PIPE FOR CORROSION RESISTANCE. *Oil Gas J.*, 52, 91, 93-98 (1953) November 30.

An inexpensive method of cement lining pipes transporting corrosive liquids is discussed. After an angle-iron "hod" filled with cement is inserted into a straight pipe and up-ended to deposit the specified amount of cement throughout, controlled rotation of the pipe establishes an even coating. Aspects of setting up such a plant are given in detail.

A. J. Tulis

Ceramics

Pechman, A. CERAMICS FOR HIGH TEMPERATURES. *Chem. Eng.*, 60, 186-190 (1953) November.

A brief survey of the ceramic field is presented along with the latest developments in ceramic coatings and cermets. Pure oxides with melting points up to 5000°F. are best for high temperature service. The temperature limit for the most refractory ceramic coating is approximately 2000°F.

E. J. Pyrcioch

Piping Systems

Olive, T. R. PROCESS PIPING. *Chem. Eng.*, 60, 187-210, (1953) December.

This article covers materials, fittings and valves for commercial sizes of process piping. Reference is made to specific problems in economic pipe sizing, construction and methods of joining pipe lengths. Many literature references are included.

W. G. Bair

Wanderer, E. T. ALUMINUM PIPING'S APPLICATIONS. *Heating, Piping and Air Conditioning*, 25, 116-19 (1953) November.

Many applications of aluminum pipe are presented and illustrated by the installations at the new Alcoa building in Pittsburgh. Also three tables are presented as to the properties of aluminum pipe available from warehouse stock.

S. Volchko

Stainless Steels

Paret, R. E. WHICH STAINLESS STEEL? *Materials and Methods*, 38, 98-101 (1953) December.

Various types of stainless steel are examined to determine the suitability of each for a given application. For valve and pump parts and especially for steam turbines at elevated temperatures the 12% chromium is selected for its high resistance to corrosive effects of hot steam. The 17% chromium improves the resistance to corrosion proportionally to the increased Cr content which together with the low coefficient of expansion helps retain a tight protective scale on the surface of the metal even after repeated heatings and coolings. The classical 18:8 grades have established themselves as the most reliable metals whether good performance is needed at high temperature or a good mechanical property is required at very low temperature. Each type has a characteristic property: type 303 has high machinability; type 304 presents a high resistance to corrosion as well as good welding properties, due to lower carbon content, which prevents a carbide precipitation. Under high-sulfur conditions at temperatures approaching 1900°F. type 446 is used. For equipment used at 800-1500°F., type 321 and 347, containing respectively titanium and columbium, are recommended. The addition of molybdenum raises the corrosion resistance of stainless steel even to such acids as sulfuric and phosphoric and to hot organic acids. These grades offer the highest creep strengths under high-temperature conditions.

S. Sensi

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National Fire Protection Association Quarterly
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Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Oil, Paint and Drug Reporter
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THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY